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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,390	03/31/2004	Marcel Gaudet	250312US6 YA	5819

22850 7590 06/08/2010

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ART UNIT	PAPER NUMBER
1715	

NOTIFICATION DATE	DELIVERY MODE
06/08/2010	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARCEL GAUDET, AELAN MOSDEN, and
ROBERT J. SOAVE

Appeal 2009-014047
Application 10/813,390
Technology Center 1700

Decided: June 4, 2010

Before: CATHERINE Q. TIMM, JEFFREY T. SMITH, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

I. STATEMENT OF CASE

Appellants appeal under 35 U.S.C. § 134 from the Examiner's decision to reject claims 1, 3, 4, 7, 8, and 10-30. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Appellants' invention relates to a method for removing chamber residue from a plasma processing system in a dry cleaning process (Spec. ¶ [0001]). Claims 1 and 29 are illustrative:

> 1. A method of removing fluoro-carbon polymer chamber residue from a plasma processing system, comprising:
>
> introducing a process gas into a process chamber of the plasma processing system, the process gas consisting of CO, CO_2, or at least one of these molecules in combination with one or more of H_2, NH_3, H_2O, N_2 or an inert gas;
>
> generating a plasma from the process gas;
>
> exposing the fluoro-carbon polymer chamber residue to the plasma in a waferless dry cleaning process to form a volatile reaction product from the residue, where a shield wafer is not provided on a substrate holder of the plasma processing system so that the substrate holder is cleaned by the waferless dry cleaning process; and
>
> exhausting the reaction product from the process chamber.
>
> 29. The method of claim 1, wherein the process gas consists of CO, CO_2 or at least one of these molecules in combination with an inert gas.

The Examiner relies upon the following evidence:

First Named Inventor	*Document No.*	*Issue or Pub. Date*
Moslehi	US 5,403,434	Apr. 4, 1995
Imai	US 6,057,247	May 2, 2000
Yeh	US 6,545,245 B2	Apr. 8, 2003
Sieber	US 7,041,608 B2	May 9, 2006
Suda	US 2004/0109263 A1	Jun. 10, 2004

The Examiner maintains the following rejections:

1. The rejection of claims 1, 3, 4, 7, 8, 10-23, and 27-30 under 35 U.S.C. § 103(a) as unpatentable over Yeh in view of Suda and Sieber or Imai; and

2. The rejection of claims 24-26 under 35 U.S.C. § 103(a) as unpatentable over Yeh in view of Suda, Sieber or Imai, and Moslehi.

With respect to the first rejection, Appellants present arguments with respect to all the rejected claims as a group (Br. 4-7), for which we select independent claim 1 as representative. Appellants do not advance any additional arguments for the second rejection (Br. 7). Thus, the issues presented for both rejections are the same.

II. ISSUE ON APPEAL

A first issue on appeal arising from the contentions of Appellants and the Examiner is: did the Examiner err in concluding that the substitution of a known oxygen plasma source with another known oxygen plasma source would have been obvious as it would have yielded predictable results?

A second issue is: did the Examiner err in concluding that it would have been obvious to conduct Yeh's process without a shield wafer?

A third issue is: have Appellants provided a showing of unexpected results such that when all the evidence is weighed anew, it supports a conclusion of non-obviousness?

We answer these questions in the negative.

III. FACTUAL FINDINGS

Except those findings that we expressly overturn or set aside in the Analysis that follows, we adopt the Examiner's findings in the Answer as our own. Additional findings of fact may also appear in the Analysis that follows.

IV. PRINCIPLES OF LAW

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). The question to be asked is "whether the improvement is more than the predictable use of prior art elements according to their established functions." *KSR,* 550 U.S. at 417.

A patent applicant can rebut a *prima facie* case of obviousness by showing "unexpected results," *i.e.,* showing that the claimed invention possesses a superior property or advantage that a person of ordinary skill in the art would have found surprising or unexpected. *See In re Geisler,* 116 F.3d 1465, 1469 (Fed. Cir. 1997) (quoting *In re Soni,* 54 F.3d 746, 750 (Fed. Cir. 1995)). "[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art." *In re Baxter Travenol Labs.,* 952 F.2d 388, 392 (Fed. Cir. 1991). Additionally, when the evidence directed to non-obviousness is directed to subject matter which is narrower than the claim, Appellants have not provided evidence of unexpected results commensurate in scope with the claimed subject matter. *See, e.g., In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) ("Even assuming that the results were unexpected, Harris needed to show results covering the scope of the claimed range. Alternatively Harris needed to narrow the claims."); *In re Greenfield,* 571 F.2d 1185, 1189 (CCPA 1978) ("Establishing that one (or a small number of) species gives unexpected results is inadequate proof, for 'it is the view of this court that objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'") (quoting *In re Tiffin,* 448 F.2d 791, 792 (CCPA 1971)).

V. ANALYSIS

Turning to the first issue, we note that the Examiner relies on the teaching of Yeh to show that it was known in the art to clean a plasma processing chamber using an oxygen plasma, the teaching of Suda to show that it was known in the art to generate an oxygen plasma from a CO or CO_2 source as a mere alternative to an O_2 plasma source, and the teachings of Sieber or Imai to show that it was known in the art that an oxygen plasma is effective in removing fluoro-carbon material (Ans. 5). The Examiner concludes that substitution of a known oxygen plasma source with another known oxygen plasma source would have been obvious as it would have yielded predictable results (Ans. 5).

Appellants point out differences between what each of the references teach as compared to what is claimed, but do not specifically dispute any of the Examiner's specific findings. We find that the evidence as a whole supports the Examiner's conclusion of obviousness.

Yeh teaches that it was known in the art to use an oxygen plasma to clean a plasma processing chamber (Yeh, col. 4, ll. 26-33). Suda teaches that it was known in the art to alternatively use CO, CO_2, or oxygen for generating oxygen plasma (*see* Suda, ¶ [0082]). While Suda uses the oxygen plasma to etch (removing material from a target) rather than to clean (removing material from the plasma chamber), the fact remains that Suda teaches known alternative sources for generating oxygen plasma. A person of ordinary skill in the art would have reasonably expected that oxygen plasma generated from any known source would have been suitable for cleaning a plasma processing chamber. Consequently, we determine that the evidence supports the Examiner's obviousness determination.

The second issue arises from Appellants' argument that one of ordinary skill in the art would not select the merely mentioned waferless process of Yeh and then modify the process using parameters of Suda, Sieber, or Imai which are not waferless processes (Br. 7). However, Yeh teaches that the RF power applied to the second electrode should be between 2W and 6W to effectively remove the polymer build up on the substrate holder, yet can be increased to between 100W and 250 W if a sacrificial substrate (dummy wafer) is positioned on the substrate holder (Yeh, col. 5, ll. 1-10). Thus, Appellants' arguments do not refute the Examiner's finding that Yeh teaches that it was known in the art to use oxygen plasma to clean a processing chamber in a waferless condition (Ans. 4).

With regard to the third issue, Appellants contend that Figures 5-7 of Appellants' Specification show that CO and/or CO_2 process gases provide superior results for cleaning a processing chamber (Br. 5). The Examiner responds that the data from Appellants' Specification is unpersuasive (Ans. 9). We agree with the Examiner that Appellants' Specification is unpersuasive as evidence of unexpected and superior results for using the claimed process gas "consisting of CO, CO_2, or at least one of these molecules in combination with one or more of H_2, NH_3, H_2O, N_2 or an inert gas" as claimed. In particular, Appellants' data does not show a clear advantage over the entire scope of the claimed invention. There is no data showing an advantage using CO in combination with H_2, NH_3, H_2O, N_2 or any inert gas other than argon, and there is no data showing any examples using CO_2 at all (*see* Spec. Figures 5-7). Further, Figure 6 shows better results from using CO and oxygen (*see* Examples 4, 5, and 7) than using CO and argon (*see* Example 3).

The evidence as a whole supports the Examiner's conclusion that using one of CO or CO_2 alone or in combination with one or more of H_2, NH_3, H_2O, N_2 or an inert gas as the source for oxygen plasma for removing fluoro-carbon polymer residue from a waferless reaction chamber would have been obvious to one of ordinary skill in the art based on the teachings of Yeh, Suda, and Sieber or Imai.

VI. CLAIMS 29 AND 30

Appellants further contend that the cited prior art references do not disclose a process gas including an inert gas, particularly argon, the subject matter of claims 20 and 30, respectively (Br. 7). The Examiner has found that Suda teaches using CO or CO_2 with nitrogen and argon to generate oxygen plasma (Suda, ¶ [0082]) and reasoned that "it is well known in the art that as both nitrogen and argon are inert gases, a mixture of the two gases substituted for one or the other also yields predictable results and is obvious" (Ans. 11-12). Appellants fail to address the Examiner's specific findings and positions articulated in the Answer or explain why these positions are deficient. A general allegation that the art does not teach a claim limitation is no more than merely pointing out the claim limitation. 37 C.F.R. § 41.37(c)(1)(vii) ("A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim."). Such overarching statements fall well short of rebutting the Examiner's prima facie case of obviousness, a position that Appellants have provided us no grounds to find unreasonable.

VII. CONCLUSION

On the record before us[1] and for the reasons discussed above, we sustain the rejections maintained by the Examiner.

VIII. DECISION

We affirm the Examiner's decision.

IX. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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[1] Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2008).